



Daffodil
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Internship Report On
Recruitment and Selection Process of National Bank Limited

Submitted to

Mr. Siddiqur Rahman

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Submitted by

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Letter of Transmittal

To,
Mr. Siddiquir Rahman
Assistant Professor & Associate Head
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Sub: Submission of the Internship Report.

Dear Sir,

As per the MBA program requirement, I have done my thesis paper on the topic of **“Recruitment and selection process of National Bank Limited”** This report reveals the sequential activities of how National bank judge their total interest rate risk through several analyses and analytical techniques. Finally, the report includes determining the different factors of interest rate risk, monitoring techniques of the interest rate risk and findings problems and making some recommendations.

I have really enjoyed working on this topic under your supervision and I hope that you will consider all of my faults generously. I would like to thank you and the University for giving me the opportunity and for helping me to prepare this report. I hope you will appreciate my sincere effort and accept this report and oblige thereby.

Sincerely Yours,



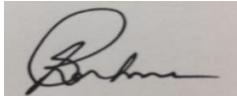
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Letter of Acceptance

This is to certify that Shamin Akter Jhumur, ID: 192-14-2969, Program: MBA, Major: HRM is a regular student of the department of Business Administration, Faculty of Business & Entrepreneurship, Daffodil International University. He has completed his internship at National Bank Ltd. and has prepared his internship report under my supervision. The data and findings presented in this internship report seem to be authentic. Thus, it has been accepted for presentation in the internship defense.

I wish him all success in life.



Mr. Siddiqur Rahman
Assistant Professor & Associate Head
Department of Business Administration
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“Recruitment and Selection Process of National Bank Limited”

Abstract

Interest income is the primary source of revenue for commercial banks in Bangladesh. Interest rate risk measurement and management is not a simple issue for commercial banks owing to the uncertainty surrounding the behavior of core deposits and the options contained in their whole balance sheets. The unfavorable fluctuation of interest rates may increase borrowing costs, reduce investor returns, reduce bank profitability, and reduce banks' net present value. Interest rate's variation affects the bank's revenue by affecting net interest income as well as other interest-sensitive income and operational expenditures. Bangladesh's commercial banks are particularly vulnerable to interest rate risk. It has a detrimental effect on the banks' profitability as well as their net worth. As a result, it discourages investors from making more investments. As a result, economic development is harmed. Bangladesh Bank establishes guidelines and numerous norms and regulations for evaluating and minimizing commercial banks' interest rate risk. There have some methods to mitigate the interest rate risk like Interest Sensitive (IS) Gap analysis, Duration analysis, Simulation Model, etc. Throughout this research, I've attempted to find out the different factors that affect interest rate risk and interest rate risk management strategies adopted by the commercial banks in Bangladesh. The required data has been collected from different sources and here both primary and secondary method has been used but the main focal point has been on the secondary sources as the required data to attain the aim is more suitable here and easy to collect.

Keywords: Interest rate risk (IRR), Commercial Bank of Bangladesh, Net Interest Income (NII), Net Interest Margin (NIM), Interest Rate Risk Management, Interest Sensitivity Analysis, Interest-Sensitive Gap (IS Gap) and Influencing factors.

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Chapter 1: Introduction

In recent times, the economy of Bangladesh is more volatile and uncertain. The financial risks of financial institutions, particularly commercial banks, have grown as the financial market's volatility and uncertainty have increased. Commercial banks perform a variety of activities, which might result in a wide range of hazards. In earlier years, commercial bank administrators and researchers concentrated mostly on credit risk and operational risk, but more lately, they have turned their attention to interest rate risk as interest rate risk is a substantial source of income for commercial banks. Interest rate risk refers to variations in the value of a bank's assets and liabilities portfolios as a result of changing interest rates. Interest rate risk is created when asset and liability have different maturities and the interest rate on the asset and liability is re-pricing. The interest revenue and interest costs of commercial banks fluctuate in response to changes in the market interest rate. Almost every commercial bank adheres to the Basel criteria for interest rate risk management. There have some methods to mitigate the interest rate risk like Interest Sensitive (IS) Gap analysis, Duration analysis, Simulation Model, etc. Moreover, Interest rate risk is driven by a number of factors in Bangladesh's banking industry, including GDP growth, inflation, net interest margin, the volume of interest-sensitive assets and liabilities, foreign currency rate, nonperforming loans, and so on. If the exposure is not properly managed, it can have a negative impact on the bank's profitability and share value. Considering the importance of interest rate risk management and identifying the major elements influencing the interest rate risk of commercial banks in Bangladesh, this research has been conducted.

1.1 Aim of the Study

This research aims to identify the interest rate risk management strategies adopted by the commercial banks in Bangladesh and the factors that influence interest rate risk.

1.2 Objectives of the Study

There have some specific objectives of this study to accomplish the aim and make the research fruitful and these are mentioned below.

1. To identify the recruitment and selection steps of NBL.
2. To analyze the technique and procedure of the recruitment & selection process of NBL.

3. To find out the problems regarding the process of recruitment & selection.
4. To develop a list of recommendations based on problems of recruitment and selection process.

1.3 The Rationale of the Study

The profitability of every financial institution highly depends on the appropriate management of the interest rate risk. Interest rate risk is a major concern for commercial banks. Commercial banks have become more reliant on interest income. The fluctuation of market interest rates is one of the most important problems for commercial banks since it affects their profitability and the value of their stock. If the risk is not appropriately managed by the management, it will pose a significant threat to the bank. If management fails to recognize the elements that influence interest rate risk, it will pose a significant risk to the bank. Moreover, Interest rate risk is influenced by both bank-specific and macroeconomic variables. Therefore, it is highly urgent to assess these factors to manage the interest risk properly. By conducting this study, the researcher has gained an understanding of how commercial banks in Bangladesh monitor and manage their risk originating from market interest rate fluctuations, as well as which variables primarily influence interest rate risk and the readers will understand various aspects regarding the interest rate risk.

1.4 Limitations of the Study

Support from a variety of sources is required to gather information and make the study read-worthy. Despite my best efforts, I have been unable to obtain certain information needed for the study at the time. Firstly, this research has been conducted in only three months but if there have been enough time then the sample size could have been extended. Again, I have no prior experience to conduct research on this area and Bank does not always provide sensitive data, which is critical for this study. Although having some focusable limitations, the researcher has been tried a lot to minimize the effect of the limitation to make the outcomes more fruitful and present in an articulated way with considering all the ethical issues properly.

Chapter 2: Literature Review

The literature on interest rate risk management has garnered the attention of a number of authors, mostly for its management. Numerous authors have already examined how the banking sector could handle interest rate risk. Numerous strategies are employed to manage interest rate risk. There are several definitions of interest rate risk management offered by various writers. According to Swamy (2013), when a bank's financial situation changes as a result of adjusting its interest rate, this is referred to as interest rate risk. Moreover, William in 2002 dictated that when a bank faces an adverse change in its revenue and capital base as a result of a change in interest rates, the gap between interest rates, the form of the yield curve and any extra interest rate connection is referred to as interest rate risk. Interest rate risk is a significant risk for the banking business, since fluctuating interest rates may affect a bank's net worth and net revenue (Cui, 2016). Ngawala and Ngre (2016) stated that Interest rate risk refers to a bank's vulnerability to adverse fluctuations in the rate of interest. When a bank changes its interest rate, it affects earnings by affecting net interest income and other interest-sensitive revenue and expenditures.

According to Allen (2000), expanding the usage of changeable assets and liabilities is the primary driver of current interest rate increases. Banks do not utilize securities portfolios to mitigate risk associated with interest rates. For a substantial number of commercial banks, interest rate risk seems to be the most significant risk. As a result, banks actively manage and monitor it. The assessment of it is not a simple undertaking for any bank (Zhou and Zheng, 2017). Interest rate risk is derived from two sources and these are called basis risk and option risk. These two are related to the sensitivity of a bank's economic value and quantifying the influence of interest rate fluctuations on the bank's net worth (Wright and Houpt, 1996). Again, Staikouras (2006) stated that interest rate risk has arisen from a variety of sources. Risks associated with re-pricing, basis risk, prepayment risk, and yield curve risk. He reasoned that interest rate risk is influenced by all four of these elements and that when the interest rate changes, the bank net value changes as well.

Aliu et al. (2016) performed a study on interest rate risk variables. They discovered many elements that affect banks' interest rate risk. Interest rate risk is influenced by both bank-specific and macroeconomic variables. The bank's interest rate risk is influenced by a variety of variables, including net profit, total costs, GDP, inflation, and interest income. While net profit and excess

expenses have a positive effect on interest rate risk, GDP and inflation have a negative effect. Interest income, on the other hand, has a different effect on interest rate risk than anticipation does, since the interest income is tied to the interest rate spread.

The experimental studies on the banking profitability's determinants are based on the bank's size, capital, total equity to total assets ratio, liquidity position, and also diverse operational effectiveness determinatives such as the microeconomic determinative, as well as indices, inflation, ownership structure, economic growth, and rate of market interest, among others, as industry and macroeconomic determinatives (Shahidul, 2016). Almost every commercial bank adheres to the Basel criteria for interest rate risk management. When a bank's non-interest revenue exceeds its total assets, the interest rate spread narrows. This narrower interest rate spread reduces the chance of generating significant money. Inflation, market share, non-interest income, and taxes, among other things, all affected the interest spreads of international commercial banks. It may initiate several systemic activities to increase the bank's revenue and profitability, which are sustainable tools for reducing the IRS (Mujeri and Younus, 2009).

Both Yüksel and Zengin (2016) are researched to ascertain the elements impacting the banking sector's interest rate risk and dictated that there is a positive correlation between bank deposit and interest rate risk, which indicates that when bank deposit increases, interest rate risk increases as well. Additionally, capital has a negative link with interest rate risk. If the bank increases its capital, it can effectively mitigate interest rate risk. According to Mujeri and Younus (2009), a bank uses a variety of methods to assess interest rate risk. For instance, IS Gap Analysis, Duration Gap Analysis, and VaR model are all examples. Typically, each bank employs IS Gap analysis or Interest Rate Sensitivity Gap analysis to assess its interest rate risk. It is computed by subtracting a bank's interest-sensitive assets from its interest-sensitive liabilities. Another widely used technique by banks for assessing interest rate risk is duration gap analysis (Beutler et al., 2015). Duration determines the average time required to repay borrowings. The duration gap metric is used to assess a bank's interest rate risk across its assets and liabilities. The value at risk, or VaR, metric quantifies the maximum losses that a portfolio may sustain below a certain degree of confidence when the market's interest rate changes (Cui, 2016).

According to Hien (2013), the banking sector employs a variety of methodologies for assessing interest rate risk. Income gap analysis, maturity structure analysis, duration gap analysis, risk-

reward analysis, and ratio analysis are just a few of the methodologies used to assess a bank's interest rate risk. Income gap analysis is used to determine the re-pricing difference between interest earned on the bank's assets and interest costs incurred on the bank's obligations over a certain time period (Burke and Warfield, 2014). To make an optimal investment selection, the investor employs a variety of strategies for evaluating interest rate risk management. For investors reviewing a bank's interest rate risk report, income sustainability and management quality are quite beneficial.

Every bank maintains and analyzes its assets and liabilities portfolios in a prudent manner, taking into consideration several risk factors. They focus on calculating the sensitivity of the stock return to changes in interest rates (Burke and Warfield, 2014). Banks forecast the circumstances of banks exposed to interest rate risk and also oversee the implementation of strategies within a country's diversified bank group. There are various risk factors, as well as their impact on the banking sector's performance. Interest rate manipulation affects the bank's revenue by affecting net interest income as well as other interest-sensitive income and operational expenditures (Scannellai and Bennardo, 2013). Interest rate risk, net interest income, and liquidity all have a positive connection. The bank utilizes interest rate risk derivatives to mitigate the interest rate risk by a certain amount (Ponniah et. al., 2014). When banks' assets and liabilities are almost the same, the negative effect of changing interest rates is mitigated. Interest rate changes have an effect on the banks' assets and liabilities (Reeta, 2016).

Several studies on a bank's interest rate risk management have been undertaken in various countries. However, a few kinds of research on this issue have been undertaken in Bangladesh. Some study has been conducted on the elements that influence interest rate risk. This research attempts to introduce Interest Rate Risk Management and identify the elements influencing interest rate risk in Bangladeshi commercial banks. In previous papers, every researcher employed IS gap analysis for interest rate risk assessment and used logit or multiple regression models to find the components that impact interest rate risk. However, in this research, IS gap analysis is employed as a measurement technique, and a Pooled OLS regression model is used to determine the elements that influence interest.

Chapter 3: Methodology

3.1 Research Method

In this study, a mixed method has been used to attain the aim of this study appropriately. The quantitative method has been used to deal with the numerical data to figure out the key issues of interest rate risk whereas there have some other issues that can't be expressed in term of number, but the consideration of these issues is highly essential therefore with a quantitative method, the qualitative method also has been used here to make this study more fruitful.

3.2 Data Collection Strategy

The required data has been collected from different sources and here both primary and secondary method has been used but the main focal point has been on the secondary sources as the required data to attain the aim is more available and easier to collect. The number of commercial banks in Bangladesh is more than fifty, therefore, it is not possible to collect and analyse the data from all banks. As a result, a simple random sampling method has been used here to select five commercial banks. Moreover, both quantitative and qualitative data has been collected from secondary sources like Journals, Articles, Annual Reports, Websites, Newspaper, Books and Research Papers and Bangladesh Bank Guidelines and Circulars.

3.3 Data Analysis Strategy

To identify the commercial banks' interest rate risk management technique, I firstly computed the net interest margin of the selected 5 banks. I have concentrated on gap analysis to manage interest rate risk and there are IS Gap, IS Ratio, and Relative IS Gap in gap analysis. I have provided a trend analysis to represent the overall situation of the net interest income and net interest margin of commercial banks in Bangladesh. I utilized regression analysis to discover the elements that influence commercial banks' interest rate risk. The pooled OLS model is utilized to do the regression in this case. The regression model is developed in the following process:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \mu$$

There is one dependent variable and seven independent variables in this study. The dependent variable in this regression model is interest rate risk, whereas the independent variables are inflation rate, GDP growth rate, return on asset, non-performing loan rate, net interest margin,

deposit to total liabilities ratio, and loan to total assets ratio. I presented the correlation matrix to illustrate the association among the independent variables before determining the elements that impact interest rate risk using regression analysis. The regression model for interest rate risk is:

$$\text{IRR} = \alpha + \beta_1 (\text{Infl}) + \beta_2 (\text{GDPGr}) + \beta_3 (\text{ROA}) + \beta_4 (\text{NPL}) + \beta_5 (\text{NIM}) + \beta_6 (\text{DTL}) + \beta_7 (\text{LOTA}) + \mu$$

Hypothesis Development

H_0 = Inflation rate, GDP growth rate, Return on Asset, Non-Performing Loan ratio, Net Interest Margin, Deposit to Total Liabilities Ratio, Loan to Total Assets ratio doesn't affect the IRR.

H_1 = Inflation rate, GDP growth rate, Return on Asset, Non-Performing Loan ratio, Net Interest Margin, Deposit to Total Liabilities Ratio, Loan to Total Assets ratio affects the IRR.

3.4 Data Analyzing Tools

I utilized a variety of technologies to analyze data. I used Microsoft Excel to calculate the Net Interest Margin, IS Gap, Relative IS Gap and Ratio of Interest Sensitive Assets to Liabilities. I used Stata software to do the regression analysis and calculate the mean, standard deviation, standard error, and correlation between the independent variables. Many bars, charts, and tables are shown for properly evaluating the data using Microsoft Excel.

3.5 Distribution of Activities over Time

This research has been conducted in 13 weeks and that was started from the 1st October to 31st December 2021. Each activity with consumed time has been shown below using a Gantt chart.

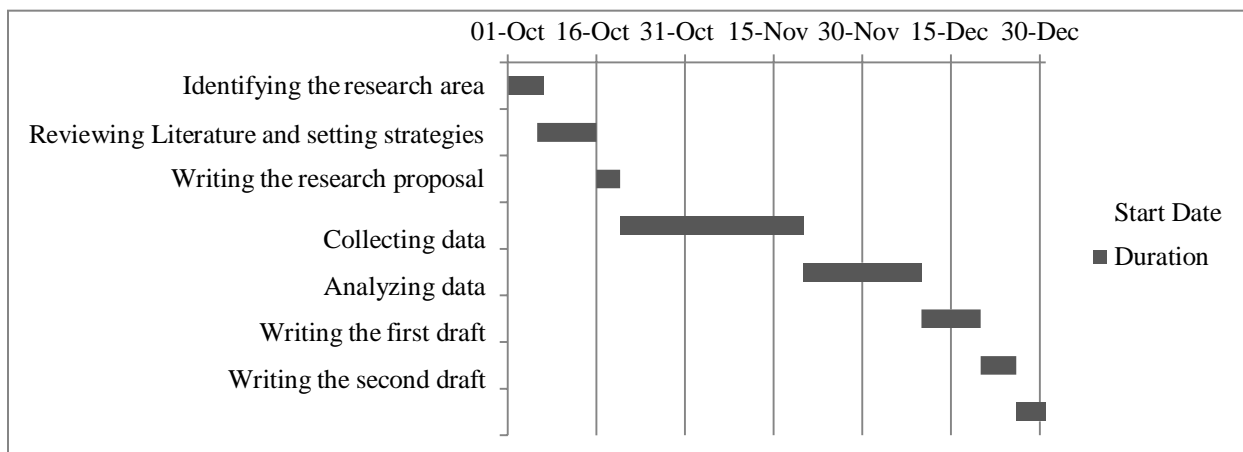


Figure 1: Gantt Charts (Self Made)

Finally, this research has been conducted by maintaining all the ethical issues properly.

Chapter 4: Organizational Overview

Bank Name	Overview
Trust Bank Ltd	Trust Bank Limited is a private commercial bank based in Bangladesh that began operations on 17th June 1999. The Army Welfare Trust provides financial assistance for the bank (AWT). To conduct banking operations effectively, the bank has 114 branches and SME service centers in 93 locations across Bangladesh.
BRAC Bank Ltd	BRAC Bank is a well-known private commercial bank in Bangladesh that began operations on July 4, 2001. The BRAC development organization is responsible for the operation of the BRAC Bank. The bank's primary focus was on SME services. By 2021, the BRAC Bank will have 187 branches, 481 agent banking outlets and 375 ATM booths.
City Bank Ltd	The City Bank Ltd. is Bangladesh's first generation bank. It is a historic bank that was founded on 28th March 1983. It has 132 branches and 400 ATM booths across Bangladesh. The City Bank employs a total of 4356 people directly to provide services to its clients. The bank provides retail banking, corporate financing, women banking, SME banking, etc.
Mercantile Bank Ltd	Mercantile Bank Ltd. is a commercial bank based in Bangladesh that began operations in 1999. The bank has 119 branches in 42 districts of Bangladesh to provide smooth banking operations. By 2021, the bank will have about 153 ATMs and 60 point-of-sale locations. Nearly 2500 workers work directly for the bank.
Eastern Bank Ltd	Eastern Bank Ltd. is a commercial bank based in Bangladesh that began operations on 8 August 1992. The bank is registered with the DSC and the CSC. To conduct banking operations effectively, the bank has 85 branches across Bangladesh. The bank operates 214 ATM booths to serve its clients. The bank employs almost 3000 people directly.

Source: Annual Report of the selected 5 banks (2020)

Chapter 5: Discussion and Data Analysis

When interest rates vary in the market, the management of commercial banks recognizes how the shift impacts the banks' revenue and costs (Aliu et al., 2016). This interest rate change has an effect on the bank's net interest revenue. Interest rate fluctuations affect the market value of banks' assets and liabilities. Additionally, it affects the bank's net value (Swamy 2013). Interest rate movements have a negative impact on the interest rate-related components of a bank's financial statement. Thus, if interest rate risk exposure is not managed effectively, it may erode commercial banks' profitability and shareholder value (Cui, 2016). Bangladesh's commercial banks adhere to the Bangladesh Bank's recommendations on interest rate risk. Bangladesh Bank updates its rules and regulations governing interest rate risk management on a regular basis.

5.1 The concept of Interest Rate Risk

Interest Rate Risk, or IRR, refers to a bank's vulnerability to adverse fluctuations in the rate of interest. Interest rate change has an effect on the bank's revenue by affecting the bank's net interest income (Brunilda, 2015). Additionally, it has an effect on the bank's net worth by affecting the economic value of interest-sensitive assets, interest-sensitive liabilities, and off-balance-sheet items (Delis and Kouretas, 2011). Banks have the most risk from interest rate risk since they rely on interest revenue more than other organizations. Interest rate risk is created in the banking business by mismatching the maturities of assets and liabilities.

5.2 Sources Interest Rate Risk

Interest rate risk is classified into four categories, each of which commercial banks encounter on a regular basis. These are sometimes referred to as interest rate risk sources (Aliu et al., 2016). Re-pricing risk, yield curve risk, basis risk, and option risk are all typical sources of interest rate risk for banks (Shahidul, 2016).

Re-pricing risk: Re-pricing risk refers to a change in the interest rate level that has a variety of implications on the bank's assets and liabilities (Cui, 2016). When interest rates fluctuate, the bank will invest the cash flow created by its assets or refinance rolled-over obligations at the new rate. To adjust the interest rate, the market values of assets and liabilities must also be adjusted.

Yield curve risk: Another form of interest rate risk is yield curve risk. Yield curve risk exists as a result of the yield curve shifting regularly as a result of re-pricing and other factors. For

example, the short-term interest rate fluctuates more quickly than the long-term interest rate, affecting the profitability of financing long-term loans and short-term deposits (Shahidul, 2016).

Basis risk: Interest rates on assets and liabilities are not modified in the same way. The basis risk arises as a result of the varying magnitudes of interest rates on distinct assets and liabilities (Ngawala and Ngre, 2016). It has an imperfect link between index rates and a range of market interest rates for identical maturities. When benchmark rates are changed, the basis risk arises.

Option risk: Option risk is a risk that arises from the bank's position in an option derivative or in the optional aspects incorporated in its assets, liabilities, and off-balance sheet components, which allow the bank to modify both the volume and duration of cash flows. It may be purchased on the traditional interest rate derivatives market (English, 2002).

5.3 Factors Influencing Interest Rate Changes

Interest rates are the fees associated with borrowing money. Alternatively, interest rates are used to compensate for risk and also to compensate for the services associated with lending cash. According to Ngawala and Ngre (2016), interest rates fluctuate for a variety of reasons. The following factors for market interest rate changes are discussed:

Inflationary expectancy: Many economists explain inflation by stating that a given amount of money will buy fewer goods in the future than it does now (Shahidul, 2016). The borrower is responsible for compensating the lender for this.

Deferred consumption: When a lender lends money to a borrower, the lender defers spending the money on consumer items (Cui, 2016). Due to the time preference principle, which states that individuals prefer goods now over commodities later, the interest rate in a free market will be positive (Mujeri and Younus, 2009).

Short-term gain: A low-interest rate may help a country's economy grow in the short run. In a typical circumstance, economists anticipate that lowering interest rates would result in a short-term boost to economic activity that will be quickly offset by inflation (Aliu et al., 2016).

Alternative investments: The money owner has the option of investing his assets in a variety of other investments. When an owner chooses one investment opportunity, he foregoes the earnings associated with other investment options, which are referred to as opportunity costs (Cui, 2016).

Investment risk: The lender is constantly in danger of the borrower dying, defaulting, or going bankrupt. The lender collects the risk premium from the borrower to ensure that the lender is reimbursed in the event of the borrower's failure (Ngawala and Ngre, 2016).

Taxes: Individuals earn interest income from their investments, which is sometimes subject to taxation. This tax is a deduction from the investor's profit. As a result, the investor charges a higher interest rate in order to offset this loss (Délèze and Korkeamäki, 2018).

Economic condition: Interest rates may fluctuate in response to a country's economic situation. Typically, when the economy is in good shape, the interest rate is high (Mujeri and Younus, 2009). However, if the economy is in poor health, the interest rate is relatively low.

5.4 Impact of the Interest Rate Risk

Interest rate risk is the primary risk that banks encounter while acting as a financial intermediary. The unexpected shift in interest rates will result in a decrease in interest revenue in the near term, which will have a long-term effect on the company's assets (Aliu et al., 2016). Commercial banks can successfully manage their internal finances as well as the capacity of their debt over time with the goal of maintaining adequate funds and being able to take advantage of lending benefits when they arise. Staikouras (2006) said that there are numerous consequences of interest rate risk that commercial banks and other financial institutions may suffer. These consequences are outlined below:

Borrowing costs: When interest rates are high, the interest rates charged on credit cards and loans are quite high. As a result, it discourages borrowers from borrowing and increasing their expenditure. The highly leveraged corporation may face further financial difficulties as a result of providing a high rate of interest to the lender (Cao, 2013).

Net worth and interest income: Interest rate movements have a significant influence on a bank's profitability. Interest income will grow or decrease as a result of the interest rate change. It also has an effect on the market value of financial institutions' shares (Staikouras, 2006).

Reduced confidence: Interest rates have an effect on company and consumer confidence. When interest rates are raised, it discourages investment. It diminishes consumers' desire to purchase and consume more (Mujeri and Younus, 2009).

Price sensitivity: As market interest rates rise, the value of current fixed-income instruments of various maturities decreases to varying degrees. The term "price sensitivity" refers to the fact that the price of securities with certain maturities is very sensitive to changes in the market interest rate, which affects the value of the assets (Tarus, Chekol and Mutwol, 2012).

Re-pricing mismatch: Differences in market interest rates may have an effect on the economic worth of banks' assets, liabilities, and off-balance sheet items because the economic value perspective considers the expected influence of interest rate movements on the current value of all possible cash flows (Yüksel and Zengin, 2016).

5.5 The Importance of Effective Interest Rate Risk Management

Numerous macroeconomic variables such as inflation, capital flows, exchange rates, and the balance of payments all have an effect on how the interest rate fluctuates (Aliu et al., 2016). The duration mismatch between commercial banks' assets and liabilities is often not significant. Government bonds are a fixed-rate instrument with a longer tenure than other types of credit (Cui, 2016). Thus, changes in interest rates often have a greater effect on the bank's investment portfolio. The relatively flat yield curve has reduced the interest margin generated by traditional banking's maturity transformation function (Ngawala and Ngre, 2016). This may persuade the bank to see the investment portfolio as an income source. This proclivity, along with difficulties in developing a competent strategy for managing the credit portfolio, has prompted numerous banks to hold government assets with higher reserve requirements (Swamy 2013).

5.6 Interest Rate Risk Management Benefits

If a bank is able to manage the interest risk properly then some benefits can be ensured, including the following:

- Defining financial objectives based on commercial risk tolerance
- Reducing income volatility (Staikouras, 2006)
- Developed a cash flow forecasting system
- Developed credit ratings for corporations
- Defining risk management and hedging techniques (Aliu et al., 2016)
- Determine the bank's capital sufficiency based on the amount and quality

5.7 Interest Rate Risk Measuring

To manage interest rate risk effectively, it is vital to have a clear knowledge of the risk's magnitude and the influence of interest rate movement on the risk's position. To quantify interest rate risk, sufficient information must be available to enable precise actions to be performed in acceptable, usually short time periods. The longer a financial institution is allowed to erase or reverse an unfavorable exposure, the greater the risk of loss (Mujeri and Younus, 2009).

Table 1: Types of Interest Rate Risk Measurement Technique

Measurement Technique	Details
IS Gap Analysis	One of the pioneering strategies to apply interest rate risk management is interest-sensitive gap analysis or IS gap analysis. The discrepancy between the volume of a bank's interest-sensitive assets and the volume of its interest-sensitive liabilities is controlled via IS gap management.
Duration Analysis	Another strategy for controlling interest rate risk in asset-liability management is duration analysis. The average time it takes to recoup the cash invested is measured by duration. By maintaining an investment to the end of the period, a bank can reduce its interest rate risk.
Simulation Models	Simulating interest rate structures allows for the prediction of short, medium, and long-term consequences. By estimating the institution's precise interest and principal cash flows for a given interest rate scenario, simulation approaches provide significantly more complex risk metrics.

Source: Swamy (2013)

Commercial banks should employ at least one of these three strategies. Every strategy offers a distinct perspective on interest rate risk, as well as varied benefits and drawbacks. As a result, using more than one approach from that list is a wise idea.

The IS gap analysis was the emphasis of this paper. It is not feasible to focus on the Duration and Simulation model here due to a lack of time and computing resources.

5.8 Interest Sensitive Gap (IS Gap) Management of National Bank

The main technique for managing interest rate risk is the IS gap. From the perspective of interest rate restructuring, the IS gap categorizes every asset, debt, and off-balance sheet component of a bank by effective maturity (Staikouras, 2006). Within the IS gap table, it compares the total quantity of assets and liabilities for each period. The comparison of the total amount of assets and obligations in each period yields a reasonable estimate of the balance sheet's interest rate risk (Mujeri and Younus, 2009). When a bank's management recognizes that its institution is overly exposed to interest rate risk, it will take steps to equalize or close the interest-sensitive assets with interest-sensitive liabilities timely (Yüksel and Zengin, 2016).

$$\text{Interest-Sensitive Gap} = \text{Interest-Sensitive Assets} - \text{Interest-Sensitive Liabilities}$$

$$\text{Or, IS Gap} = \text{ISA} - \text{ISL}$$

There are three categorized IS gap analyses:

- Positive IS gap
- Negative IS gap
- Zero IS gap

The positive IS gap is asset sensitive and occurs when ISA is greater than ISL. When the interest rate goes up, the bank's NIM goes up, and when the interest rate goes down, the bank's Net Interest Margin or NIM goes down (Hien, 2013). On the other hand, the negative IS gap, which is liability sensitive, occurs when ISL exceeds ISA. When the interest rate goes up, the bank's NIM goes down, and when the interest rate goes down, the bank's NIM goes up (Alessandri and Drehmann, 2010). When the quantity of ISA equals the amount of ISL then it can be categorized as a zero IS gap. Changing the interest rate on an equal amount of ISA and ISL has no effect on the net interest margin.

Table 2: Appropriate Strategies in Different Interest Rate Scenarios

Scenario	Strategy
Rising Interest Rate	Maintain a Positive Gap
Declining Interest Rate	Maintain a Negative Gap
Uncertain Situation	Maintain a Zero Gap

Source: Staikouras (2006)

5.9 Management of Net Interest Margin

Interest rate movements have a favorable or negative impact on a bank's net interest revenue. It is the immediate consequence of a change in interest rates. However, if the interest rate is changed over time, it has an impact on a bank's net worth (Yüksel and Zengin, 2016). Net interest income (NII) is the difference between the interest earned on a bank's assets and the interest paid on its obligations (Hien, 2013). The bank's income statement shows the net interest income. It might be favorable or unfavorable. A bank's net interest income is determined by subtracting interest expenditures from interest earnings. The formula of net interest income is,

$$\text{Net Interest Income} = \text{Interest Income} - \text{Interest Expense}$$

Table 3: Net Interest Income (NII) of the Selected 5 Banks (2011-2020)

(BDT in million)

Year	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	1378.25	5638.05	4409.87	3370.86	1737.99
2012	1912.96	6824.47	4734.57	4885.52	1963.76
2013	1439.19	6668.97	4800.38	4956.24	1619.98
2014	2879.52	7601.99	5058.32	4087.94	2574.41
2015	3920.1	9503.8	5405.33	3682.74	2521.03
2016	4493.91	11720.9	6511.19	5607.23	3227.6
2017	5546.92	13533.5	7539.26	5878.62	3430.65
2018	6258.01	15817.5	9230.16	7506.22	4174.48
2019	6282.06	17924.76	10911.22	8276.90	5035.09
2020	4180.63	13528.08	8456.94	6051.87	2733.94

Source: Annual Report of the selected 5 banks (2011-2020)

These five banks' net interest income is positive in every year but for 2020, it is negative. It varies from year to year due to changes in interest rates, the quantity of interest-sensitive assets and obligations, and other factors. Increases in the interest rate might raise interest income more than interest costs when the spread between interest-sensitive assets and interest-sensitive liabilities widens. As a result, net interest income rises. When the spread between interest-sensitive assets and liabilities narrows, on the other hand, an increase in interest rate might boost

interest costs more than interest earnings. As a result, net interest income falls. Increases or decreases in the banks' non-performing assets have an impact on net interest income.

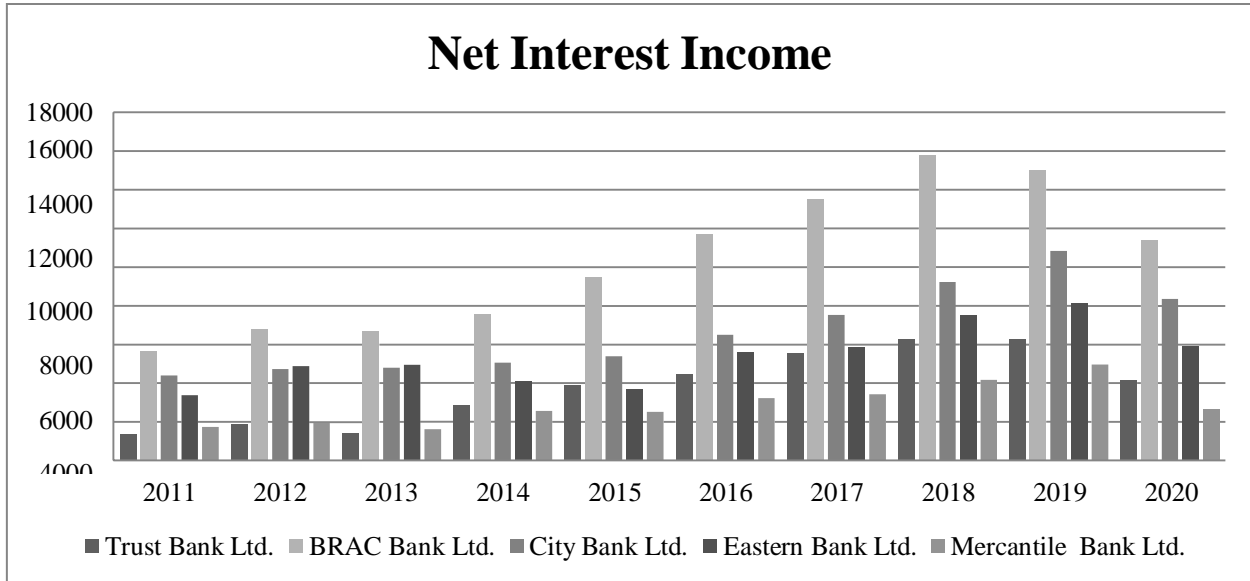


Figure 2: Trend of Net Interest Income of the Selected 5 Banks (2011-2020)

Source: Annual Report (2011-2020)

The graph depicts the ten-year trend of the selected five banks' net interest income. However, the net interest revenue of these five banks has nearly tripled in 2019. But the net interest income has been declined in 2020 of all the five banks. That is to say, the tendency of commercial banks' net interest revenue is increasing every year since their interest income exceeds their interest costs but due to some economic issues like the Covid-19 pandemic it has been declined in 2020.

Again, a bank's net interest margin, or NIM, is computed by dividing net interest revenue by total earning assets. It may be described as a performance statistic that measures the bank's success in making investment decisions in contrast to its debt. If the net interest margin is negative, the interest income is less than the interest costs, indicating that the management is not making the optimal investment option.

However, if the net interest margin is positive, the interest revenue exceeds the interest expense. A positive net interest margin is a good indicator for a bank since it indicates that management is making the best investment decision. The formula of Net Interest Margin is,

$$\text{Net Interest Margin} = \text{Net Interest Income} \div \text{Total Earning Assets}$$

Table 4: The Result of the Net Interest Margin of the Selected 5 Banks (2011 to 2020)

Year	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	2.18%	4.67%	4.33%	3.22%	1.69%
2012	2.40%	4.19%	4.16%	4.09%	1.56%
2013	1.45%	3.95%	3.69%	3.72%	1.35%
2014	2.28%	3.97%	3.17%	2.79%	1.84%
2015	2.53%	4.52%	3.22%	2.25%	1.82%
2016	2.67%	5.03%	3.26%	3.05%	1.90%
2017	2.69%	4.99%	3.41%	2.65%	1.44%
2018	2.88%	5.15%	3.40%	3.03%	1.56%
2019	2.56%	5.05%	3.76%	2.82%	1.73%
2020	1.26%	3.30%	2.43%	1.95%	0.888%

Source: Author's Calculation Based on Annual Report (2011-2020)

Appendix 1 displays the primary calculation. These five banks have a positive net interest margin, which varies from year to year owing to changes in net interest income and total earning assets. They have a positive net interest margin practically every year. As a result, commercial banks' net interest revenue and net interest margin are positive practically every year.

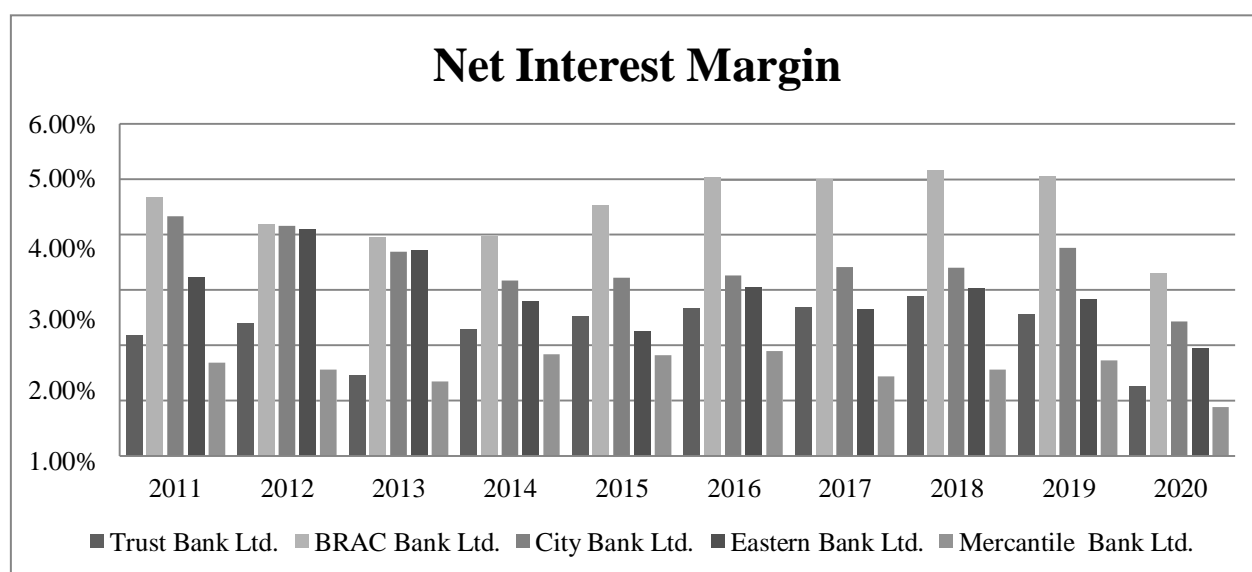


Figure 3: Trend of Net Interest Margin of the Selected 5 Banks (2011-2020)
Source: Annual Report (2011-2020)

From 2011 to 2020, this graph depicts the trend of the five banks' net interest margins. The trend of net interest margin of these banks is positive except in 2020, but it does not increase every year, as seen in the graph. The reason for this is that the banks' net interest revenue is changing, as are their earning assets. The fact that the net interest margin is positive indicates that the banks have made sound investment decisions.

5.10 Interest Sensitivity Analysis (GAP Management) of the Commercial Banks

The interest sensitivity gap, or IS gap, is the primary approach that a bank employs to manage interest rate risk. It is calculated as the subtraction of interest-sensitive assets and liabilities.

$$\text{Interest Sensitive Gap} = \text{Interest Sensitive Assets} - \text{Interest Sensitive Liabilities}$$

Interest sensitive assets = Addition of Balance with other banks and FIS, Money at call, Investment, Loans and Advances and Other Assets

Interest sensitive liabilities = Addition of Borrowings, Deposits and Other liabilities

Table 5: Cumulative Interest Sensitive Gap of the Selected 5 Banks for the Year 2020

Bank Name	Particular	Up to 1 Month	1-3 Months	3-12 Months
Trust Bank Ltd.	IS Gap	-41319.8	-13190.2	-18394.78
	Cumulative Gap	-41319.8	-54510	-72904.8
	Situation	Liability Sensitive	Liability Sensitive	Liability Sensitive
	Risk	Losses if interest rate rise	Losses if interest rate rise	Losses if interest rate rise
BRAC Bank Ltd.	IS Gap	6469.37	-3172.93	11710.1
	Cumulative Gap	6469.37	3296.44	15006.54
	Situation	Asset Sensitive	Liability Sensitive	Asset Sensitive
	Risk	Losses if interest rates fall	Losses if interest rate rise	Losses if interest rates fall
City Bank Ltd.	IS Gap	-15813.1	18281.36	-34686.14
	Cumulative Gap	-15813.1	2468.26	-32217.88
	Situation	Liability Sensitive	Asset Sensitive	Liability Sensitive
	Risk	Losses if interest rate rise	Losses if interest rates fall	Losses if interest rate rise
Eastern Bank Ltd.	IS Gap	114.13	-13151.5	29095.22
	Cumulative Gap	114.13	-13037.4	16057.85
	Situation	Asset Sensitive	Liability Sensitive	Asset Sensitive

	Risk	Losses if interest rates fall	Losses if interest rate rise	Losses if interest rates fall
Mercantile Bank Ltd.	IS Gap	1409.68	-228.36	23014.24
	Cumulative Gap	1409.68	1181.32	24195.56
	Situation	Asset Sensitive	Liability Sensitive	Asset Sensitive
	Risk	Losses if interest rates fall	Losses if interest rate rise	Losses if interest rates fall

Source: Author's Calculation Based on the Annual Report (2020)

The entire computation is included in Appendix-2. It is obvious from this table that a bank might be liability sensitive in one maturity bucket and asset sensitive in another. Through the cumulative gap, it may ascertain the bank's true position inside the specified maturity bucket. If the bank is asset sensitive and the interest rate falls, or if the bank is liability sensitive and the interest rate rises, the bank will suffer a loss. Because altering the interest rate affects the bank's interest revenue and cost, it affects both the net interest income and the net interest margin. A liability sensitive institution is benefited when the interest rate is fall and an asset sensitive institution is benefited when the interest rate is enhanced.

Table 6: The Result of the IS Gap of the Selected 5 Banks (2011 to 2020)

Year	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	-21094.845	9651.52	217.34	-11435.46	-1509.21
2012	-22516.997	-14628.94	16725.85	-21644.12	-3165.03
2013	-23499.187	-18492.44	32945.42	715.14	-9013.39
2014	-22929.735	-20005.52	27003.32	10421.55	-6777.24
2015	-16357.291	-10864.13	11982.2	654.92	1107.15
2016	-7008.4677	-789.69	19450.05	10669.12	-3060.74
2017	-2205.4795	1662.26	3759.79	17859.32	421.73
2018	-2692.4034	7214.78	13035.68	23414.44	9263.24
2019	-55795.131	-555.55	-9344.69	12604.58	10067.98
2020	-72904.792	15006.4152	-32217.89	14011.44	7006.93

Source: Author's Calculation Based on Annual Report (2011-2020)

Appendix 3, summarizes the entire computation of the IS gap of the chosen five banks. In 2011, Trust Bank, Eastern Bank, and Mercantile Bank had a negative IS gap; whilst BRAC Bank and City Bank had a positive IS gap. However, in 2020, Trust Bank and City Bank have a negative

IS gap; whilst BRAC Bank, Eastern Bank, and Mercantile Bank have a positive IS gap. The chart demonstrates that the state of the IS gap in all commercial banks does not remain constant each year. The positive IS gap indicates that the bank's interest-sensitive assets exceed its interest-sensitive liabilities; whilst the negative IS gap indicates that the bank's interest-sensitive liabilities exceed its interest-sensitive assets.

Table 7: The Result of Relative IS Gap (2011-2020)

Year	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	-0.3620	0.0822	0.0024	-0.1393	-0.0173
2012	-0.2954	-0.1065	0.1445	-0.1840	-0.0272
2013	-0.2467	-0.1044	0.2531	0.0049	-0.0590
2014	-0.1964	-0.1113	0.1831	0.0660	-0.0468
2015	-0.1125	-0.0531	0.0676	0.0038	0.0066
2016	-0.0389	-0.0035	0.3880	0.0563	-0.0167
2017	-0.0105	0.0067	0.0616	0.0846	0.0021
2018	-0.0112	0.0258	0.1319	0.0925	0.0356
2019	-0.2149	-0.0018	-0.0688	0.0446	0.0346
2020	-0.2472	0.0408	-0.2723	0.0418	0.0221

Source: Author's Calculation Based on Annual Report (2011-2020)

The table illustrates the resultant relative IS gap of the chosen five banks from 2011 to 2020. The relative IS gap is calculated in Appendix 4. In 2011, Trust Bank, Eastern Bank, and Mercantile Bank all had a negative relative IS gap, indicating that these two banks are liability sensitive, whilst BRAC Bank and City Bank had a positive relative IS gap, indicating that these two banks are asset sensitive. This scenario varies from year to year. For that reason, Trust Bank and City Bank's relative IS gap is negative in 2020, but the other three banks' relative IS gap is positive. That is, each year, the relative IS gap of a commercial bank changes as its IS gap changes. Banks that are asset-sensitive will make a profit from a rise in interest rates and suffer a loss if interest rates fall. If banks are liability sensitive, they will suffer a loss if interest rates rise and will make a profit if interest rates fall.

Table 8: The Result of Interest Sensitivity Ratio of the Selected 5 Banks (2011-2020)

Year	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	0.5673	1.1661	1.0041	0.8118	0.9685
2012	0.6426	0.8229	1.4208	0.7655	0.9488
2013	0.7069	0.8344	1.8297	1.0077	0.8991
2014	0.7568	0.8129	1.5437	1.1197	0.9110
2015	0.8339	0.9044	1.1474	1.0067	1.0128
2016	0.9400	0.9931	1.1926	1.1066	0.9692
2017	0.9842	1.0106	1.0290	1.1739	1.0040
2018	0.9833	1.0391	1.0925	1.1861	1.0660
2019	0.7076	0.9971	0.9503	1.0830	1.0656
2020	0.6757	1.0590	0.8537	1.0771	1.0446

Source: Author's Calculation Based on Annual Report (2011-2020)

The table illustrates the outcome of the interest-sensitivity ratio, or IS ratio, of five chosen commercial banks from 2011 to 2020, with the underlying computation shown in Appendix 5. Each year, these five banks' IS ratios are adjusted. In 2011, the IS ratios of BRAC Bank and City Bank were more than 1, indicating that they are asset-sensitive institutions, whilst the ratios of the other three banks were less than 1, indicating that they are liability-sensitive institutions. In 2020, Trust Bank and City Bank's IS ratios are less than one, indicating that they are liability sensitive institutions, whilst the IS ratios of the other three banks are more than one, indicating that they are asset sensitive organizations. The table demonstrates that commercial banks' IS ratios alter annually in response to changes in their ISA and ISL.

When a bank's IS ratio exceeds one, it might gain from an increase in interest rates and suffer a loss if interest rates fall. However, if a bank's IS ratio is less than one, the situation is different. At that point, the bank may gain from a fall in interest rates and suffer a loss if interest rates rise.

Table 9: The Summary of Interest-Sensitive Analysis

Sensitivity	Possible Outcome
Asset-Sensitive	Positive IS Gap
	Positive Relative IS Gap
	Interest Sensitivity Ratio greater than one
Liability-Sensitive	Negative IS Gap
	Negative Relative IS Gap
	Interest Sensitivity Ratio less than one

Source: Own Analysis Compilation Based on Literature

The table above summarizes the interest-sensitive analysis. To mitigate interest rate risk, Bangladesh's commercial banks strive to maintain an equal or nearly equal balance of interest-sensitive assets and liabilities. If the value of interest-sensitive assets and liabilities is equal or nearly equal, the IS gap is zero, assisting banks in mitigating interest rate risk. If the IS gap is zero or near to zero, interest income and financing expenditures will change in the same proportion. Additionally, it helps safeguard net interest income and net interest margin from interest rate changes. The zero-gap does not eliminate a bank's whole interest rate risk. As a result, in the real world, the interest rates associated with assets and obligations are not perfectly related.

5.11 Limitations of IS Gap Analysis

Though the usage of the IS gap analysis helps in many ways to cover up the interest rate risk management it has some focusable drawbacks, which are mentioned below:

- The interest rate on a bank's assets and liabilities does not fluctuate in conjunction with the market interest rate.
- It is very difficult to determine the moment at which the bank's assets and liabilities should be revalued.
- IS gap does not account for the impact of changing interest rates on a bank's equity
- IS gap does not account for a bank's basis risk as well as investment risk
- IS gap does not care for the time value of money

5.12 Factors that Affect the Interest Rate Risk

Interest rate risk is the current and potential risk to the revenue and capital of commercial banks caused by adverse fluctuations in interest rates that affect the banks' book positions. Interest rate risk is influenced by a variety of variables. However, it is not straightforward to theoretically characterize which variables impact commercial banks' interest rate risk. It is simple to determine the components that impact interest rate risk using regression analysis. The regression is carried out using a pooled OLS model. This section discusses descriptive and inferential analysis.

Table 10: Mean, Standard Deviation, and Standard Error

Variables	Mean	Standard Deviation	Standard Error	Observation
Infl	0.0685	0.0177	0.0025	50
GDPGr	0.0676	0.0079	0.0011	50
ROA	0.0128	0.0059	0.0008	50
NPL	0.0439	0.0166	0.0023	50
NIM	0.0312	0.0109	0.0015	50
DTL	0.8321	0.0845	0.0119	50
LOTA	0.7965	0.0687	0.0097	50

Source: Estimated by the Author The table displays the mean, standard deviation, and standard error for the seven independent variables as a whole. There are a total of 50 observations. The Deposit to Total Liability Ratio

(DTL) has the greatest mean of 0.8321 and the lowest mean of 0.0128 (ROA). ROA has a standard deviation of 0.0059 and a standard error of 0.0008, the lowest values.

Table 11: Correlation Matrix

	Infl	GDPGr	ROA	NPL	NIM	DTL	LOTA
Infl	1						
GDPGr	-0.55094	1					
ROA	0.344156	-0.26095	1				
NPL	-0.2115	0.058558	-0.42899	1			
NIM	0.035691	0.006517	0.37094	0.183033	1		
DTL	0.207159	-0.12798	-0.27694	-0.07508	-0.5408	1	
LOTA	-0.25344	0.374171	-0.05044	-0.18618	-0.44745	0.164949	1

Source: Estimated by the Author

The figure above depicts the correlation between the independent variables. Correlations between the seven independent variables are modest since they are less than 0.70. The association between inflation and GDP growth rate is the lowest at -0.55094. The connection between GDP growth rate and net interest margin is 0.006517.

Table 12: Pooled OLS Regression Result on Interest Rate Risk

IRR	Coefficient	P> t 	Prob>F	R-Square	Adjusted R-Square
Infl	.2748276	0.647	0.0000	0.6150	0.5508
GDPGr	-3.242124	0.020			
ROA	-5.043108	0.014			
NPL	.1423134	0.813			
NIM	-2.264189	0.049			
DTL	-.2995352	0.017			
LOTA	.788483	0.000			
Constant	.99586	0.000			

Source: Estimated by the Author

$$\text{IRR} = .99586 + .2748276 (\text{Infl}) - 3.242124 (\text{GDPGr}) - 5.043108 (\text{ROA}) + .1423134 (\text{NPL}) - 2.264189 (\text{NIM}) - .2995352 (\text{DTL}) + .788483 (\text{LOTA}) + \mu$$

The table illustrates the outcome of the Pooled OLS model's analysis of Interest Rate Risk. The whole result is included in Appendix 6. IRR is the dependent variable in the Pooled OLS model, whereas inflation rate, GDP growth rate, ROA, NPL ratio, NIM, deposit-to-total-liability ratio, and loan-to-total-asset ratio are the independent variables. There are a total of 50 observations. The R-square value is 61.50 percent, whereas the adjusted R-square value is 55.08 percent. The R-square implies that the independent variables may depict 61.50% of the variation in interest rate risk. F has a probability of 0.0000, which is less than the 1% significance threshold, indicating that the model is significant and contains no variables with a coefficient value of zero. The P-value of the inflation rate is .647 and the NPL ratio is .813 which is more than the significant level of .05. When P-value is more than .05, the null hypothesis can be accepted. So,

the null hypothesis H_{01} and H_{04} is true. That means,

H_{01} = Inflation rate doesn't affect the Interest Rate Risk

H_{04} = Non-Performing Loan ratio doesn't affect the Interest Rate Risk

The P-value of GDP growth rate, ROA, NIM, Deposit to Total Liability ratio, and Loan to Total Asset ratio is respectably .020, .014, .049, .017, and .000 which are less than the significant level .05. So the null hypothesis is rejected and accepts the alternative hypothesis. Here, the alternative hypotheses H_{12} , H_{13} , H_{15} , H_{16} , H_{17} are true. That means,

H_{12} = GDP growth rate affects the Interest Rate Risk

H_{13} = Return on Asset affects the Interest Rate Risk

H_{15} = Net Interest Margin affects the Interest Rate Risk

H_{16} = Deposit to Total Liabilities ratio affects the Interest Rate Risk

H_{17} = Loan to Total Assets ratio affects the Interest Rate Risk

GDP growth rate, ROA, NIM, and Deposit to Total Liability ratio all have negative coefficients, but the Loan to Total Asset ratio has a positive coefficient. Thus, when the GDP growth rate is raised by one unit, the interest rate risk is lowered by -3.242124. When ROA is enhanced by one unit, the 5.043108 unit of interest rate risk is reduced. When the NIM is raised by one unit, interest rate risk is reduced by 2.264189 units; when the Deposit to Total Liability ratio is increased by one unit, interest rate risk is reduced by .2995352 units. When the Loan to Total Asset ratio is raised by one unit, interest rate risk is increased by .788483 units.

To get an accurate, unbiased, and efficient outcome, either a fixed effect or a random effect regression model must be used. Which of these two regression models is more suited to that is determined using the Hausman test. However, the majority of academics assert that the pooled OLS regression model outperforms the fixed effect or random effect regression models. As a

consequence, this analysis section focuses only on the pooled OLS model, whereas the appendix contains the results of the fixed effect regression model (Appendix 7), the random effect regression model (Appendix 8), and the Hausman test (Appendix 9).

Chapter 6: Findings and Recommendations

I have discovered several issues when completing this report. "Recruitment and selection process" is the title of the paper. There have been identified the commercial banks' net interest margin conditions over the last decade, their Interest Sensitive Gap position, their Relative IS Gap, their interest sensitivity ratio, as well as the effects of interest rate changes on profit and net worth, and the factors affecting the commercial banks' interest rate risk. The following are the report's most significant findings:

1. According to the examination of the chosen five banks, commercial banks' net interest revenue and net interest margin are usually positive and adequate from 2011 to 2019 but in 2020, it has been declined due to the Covid-19 pandemic.
2. Why Commercial banks assessed interest-sensitive assets and liabilities over three maturity buckets and used sensitivity analysis to determine the risk level associated with interest rates.
3. According to the study, the commercial banks' IS gap might be either positive or negative. The position of a commercial bank on the IS gap varies from year to year. Net interest revenue may be reduced as a result of unfavorable interest rate movement, resulting in a loss for the banks.
4. According to the research of the chosen five banks, the cumulative IS gap is either positive or negative in 2020. Thus, if the IS gap is positive, commercial banks will suffer a loss if the interest rate is reduced; conversely, if the IS gap is negative; commercial banks would suffer a loss if the interest rate is raised.
5. According to the study of the chosen institutions, the commercial banks' relative sensitivity gap is both positive and negative. That is, the commercial banks' relative sensitivity gap changes annually as their interest-sensitive assets and liabilities fluctuate.
6. The interest sensitivity ratio of the chosen five banks is not equal to one, according to the research. It is less than or equal to one.
7. As per Pooled OLS regression model, the GDP growth rate, ROA, NIM, deposit to total liability ratio, and loan to total asset ratio all impact the commercial banks' interest rate risks.

8. The GDP growth rate, ROA, NIM, and Deposit to Total Liability ratio all have a negative effect on the interest rate risk of commercial banks in Bangladesh; however, the Loan to Total Asset ratio has a favorable effect.

From the above discussion, the following suggestions have been made:

1. National bank management can calculate the appropriate level of rate-sensitive assets and liabilities to hold and accurately forecast the interest rate so that the management of commercial banks understands when it is necessary to keep more interest-sensitive assets or liabilities.
2. National banks may control interest rate risk using a variety of interest rate risk management approaches. As a result, it contributes to the reduction of the limits imposed by single procedures.
3. National banks may employ interest rate derivatives to manage their asset and liability situations. Banks may mitigate interest rate risk via diversification or hedging techniques such as interest rate swaps.
4. National banks may mitigate interest rate risk by increasing their focus on non-interest income. They may also mitigate risk by adhering to the Basel Committee's rules.
5. By maintaining a Zero IS gap, commercial banks may mitigate their interest rate risk. Due to the zero-gap requirement, interest rate fluctuations have no effect on commercial banks' net interest revenue.
6. National banks may mitigate interest rate risk by ensuring that interest-sensitive assets and liabilities have the same duration.
7. To mitigate interest rate risk, National banks must firstly identify the elements that influence interest rate risk and then carefully manage these aspects.
8. To mitigate interest rate risk, commercial banks may reduce deposit-to-total-liabilities ratios and closely monitor their loan-to-total-assets ratios.

By following the above recommendation, the National bank of Bangladesh can successfully manage the interest rate risk and increase the business interest in a greater way.

Chapter 7: Conclusion

In conclusion, every financial organization, such as a bank, must use risk management systems that accurately and regularly quantify the financial institution's exposure to possible interest rate fluctuations. When picking correct interest rate circumstances from which to quantify the effect of interest rate movement, the financial institution must consider both the expected volatility of interest rates and the time period during which the institution may practically react to the local situation. Interest rate risk is the current and potential risk to the revenue and capital of commercial banks caused by adverse fluctuations in interest rates that affect the banks' book positions. Concerning interest rate risk monitoring and control, it is critical for national banks to include all aspects of interest rate risk exposure into their management systems. There are several ways for assessing interest rate risk, including IS Gap analysis, Duration analysis, and simulation modeling. National banks use at least one of these measures, or a mix of them, to manage their interest rate risk exposure. The state of the IS gap in all commercial banks varies from year to year. The positive IS gap indicates that the bank's interest-sensitive assets exceed its interest-sensitive liabilities; whilst the negative IS gap indicates that the bank's interest-sensitive liabilities exceed its interest-sensitive assets. When the IS gap is positive, banks gain profit from increasing interest rates and suffer losses when interest rates are dropped. However, in the negative IS gap, commercial banks generate profit from lower interest rates and suffer losses when interest rates rise. Commercial banks use a variety of methods to determine the value of the capital requirement for interest rate risk. They use techniques such as cumulative gap analysis, gap analysis, relative IS gap analysis, IS ratio analysis, and duration analysis. It is critical to determine which variables impact the commercial banks' interest rate risk because if the commercial banks do not know and understand the link between the affected elements, they would be unable to manage their interest rate risk. GDP growth rate, ROA, NIM, loan to total assets ratio, and deposit to total liabilities ratio all have an effect on commercial banks' interest rate risk. After examining this paper, it can be concluded that Bangladesh's commercial banks can protect themselves from interest rate risk by evaluating the risk properly. They may also manage interest rate risk effectively if they follow the Bangladesh Bank's guidelines properly.

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Chapter 9: Appendices

1. Calculation of Net Interest Margin of the Selected 5 Banks (2011 to 2020)

(BDT in million)

Year	Particulars	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	Net Interest Income	1378.25	5638.05	4409.87	3370.86	1737.99
	Earning assets	63120	120808	101768	104572	103076
	NIM	2.18%	4.67%	4.33%	3.22%	1.69%
2012	Net Interest Income	1912.96	6824.47	4734.57	4885.52	1963.76
	Earning assets	79626	162940	113699	119334	125936
	NIM	2.40%	4.19%	4.16%	4.09%	1.56%
2013	Net Interest Income	1439.19	6668.97	4800.38	4956.24	1619.98
	Earning assets	99026	168625	130066	133057	119833
	NIM	1.45%	3.95%	3.69%	3.72%	1.35%
2014	Net Interest Income	2879.52	7601.99	5058.32	4087.94	2574.41
	Earning assets	126283	191690	159656	146689	139712
	NIM	2.28%	3.97%	3.17%	2.79%	1.84%
2015	Net Interest Income	3920.1	9503.8	5405.33	3682.74	2521.03
	Earning assets	154765	210372	167913	163993	138809
	NIM	2.53%	4.52%	3.22%	2.25%	1.82%
2016	Net Interest Income	4493.91	11720.9	6511.19	5607.23	3227.6
	Earning assets	168285	232911	199508	183761	169784
	NIM	2.67%	5.03%	3.26%	3.05%	1.90%
2017	Net Interest Income	5546.92	13533.48	7539.26	5878.62	3430.65
	Earning assets	206183	271282	220875	221798	238681
	NIM	2.69%	4.99%	3.41%	2.65%	1.44%
2018	Net Interest Income	6258.01	15817.45	9230.16	7506.22	4174.48
	Earning assets	217173	307272	271706	247935	267358
	NIM	2.88%	5.15%	3.40%	3.03%	1.56%
2019	Net Interest Income	6282.06	17924.76	10911.22	8276.90	5035.09
	Earning assets	245622	355147	290209	292905	291195
	NIM	2.56%	5.05%	3.76%	2.82%	1.73%
2020	Net Interest Income	4180.63	13528.08	8456.94	6051.87	2733.94
	Earning assets	330938	410184	348325	310015	307733
	NIM	1.26%	3.30%	2.43%	1.95%	0.888%

Source: Author's Calculation Based on Annual Report (2011-2020)

2. Calculation of Cumulative Interest Sensitive Gap for the Year 2020

(BDT in million)

Bank	Particulars	Up to 1 Month	1-3 Months	3-12 Months	Total
Trust Bank Ltd.	ISA	28720.03	44788.85	78420.17	151929.05
	ISL	70039.8	57979.09	96814.95	224833.84
	IS Gap	-41319.8	-13190.2	-18394.78	
	Cumulative Gap	-41319.8	-54510	-72904.8	
	Situation	Liability Sensitive	Liability Sensitive	Liability Sensitive	
	Risk	Losses if interest rate rise	Losses if interest rate rise	Losses if interest rate rise	
BRAC Bank Ltd.	ISA	67621.69	64738.98	137003.2	269363.87
	ISL	61152.32	67911.91	125293.1	254357.29
	IS Gap	6469.37	-3172.93	11710.1	
	Cumulative Gap	6469.37	3296.44	15006.54	
	Situation	Asset Sensitive	Liability Sensitive	Asset Sensitive	
	Risk	Losses if interest rates fall	Losses if interest rate rise	Losses if interest rates fall	
City Bank Ltd.	ISA	30047.10	79046.56	78971.32	188064.98
	ISL	45860.19	60765.20	113657.46	220282.89
	IS Gap	-15813.1	18281.36	-34686.14	
	Cumulative Gap	-15813.1	2468.26	-32217.88	
	Situation	Liability Sensitive	Asset Sensitive	Liability Sensitive	
	Risk	Losses if interest rate rise	Losses if interest rates fall	Losses if interest rate rise	
Eastern Bank Ltd.	ISA	39294.87	45283.45	115381.9	199960.18
	ISL	39180.74	58434.92	86285.97	183901.63
	IS Gap	114.13	-13151.5	29095.22	
	Cumulative Gap	114.13	-13037.4	16057.85	
	Situation	Asset Sensitive	Liability Sensitive	Asset Sensitive	
	Risk	Losses if interest rates fall	Losses if interest rate rise	Losses if interest rates fall	
Mercantile Bank Ltd.	ISA	43665.57	32272.09	91763.39	167701.05
	ISL	42255.89	32500.45	68749.15	143505.49
	IS Gap	1409.68	-228.36	23014.24	
	Cumulative Gap	1409.68	1181.32	24195.56	
	Situation	Asset Sensitive	Liability Sensitive	Asset Sensitive	
	Risk	Losses if interest rates fall	Losses if interest rate rise	Losses if interest rates fall	

Source: Author's Calculation Based on the Annual Report of the Selected 5 Banks (2020)

3. Calculation of IS Gap of the Selected 5 Banks (2011-2020)

(BDT in million)

Year	Particular	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	ISA	27659.2368	67754.9	53745.71	49321.3	46415.11
	ISL	48754.0818	58103.38	53528.37	60756.76	47924.32
	IS Gap	-21094.845	9651.52	217.34	-11435.46	-1509.21
2012	ISA	40477.6945	67969.85	56470.52	70665.02	58610.68
	ISL	62994.6914	82598.79	39744.67	92309.14	61775.71
	IS Gap	-22516.997	-14628.94	16725.85	-21644.12	-3165.03
2013	ISA	56670.921	93162.43	72654.21	93580.13	80303.91
	ISL	80170.1082	111654.87	39708.79	92864.99	89317.3
	IS Gap	-23499.187	-18492.44	32945.42	715.14	-9013.39
2014	ISA	71364.9052	86937.39	76664.95	97515.02	69354.74
	ISL	94294.64	106942.91	49661.63	87093.47	76131.98
	IS Gap	-22929.735	-20005.52	27003.32	10421.55	-6777.24
2015	ISA	82146.6106	102728.47	93247.86	98870.49	87317.62
	ISL	98503.9013	113592.6	81265.66	98215.57	86210.47
	IS Gap	-16357.291	-10864.13	11982.2	654.92	1107.15
2016	ISA	109891.446	113578.61	120414.7	110744.75	96328.55
	ISL	116899.914	114368.3	100964.65	100075.63	99389.29
	IS Gap	-7008.4677	-789.69	19450.05	10669.12	-3060.74
2017	ISA	137282.406	158139.19	133267.75	120587.51	105114.36
	ISL	139487.885	156476.93	129507.96	102728.19	104692.63
	IS Gap	-2205.4795	1662.26	3759.79	17859.32	421.73
2018	ISA	158843.583	191764.86	153923.74	149225	149689.27
	ISL	161535.987	184550.08	140888.06	125810.56	140426.03
	IS Gap	-2692.4034	7214.78	13035.68	23414.44	9263.24
2019	ISA	135048.32	193865.61	178694.9	164402.33	163468.62
	ISL	190843.451	194421.16	188039.59	151797.75	153400.64
	IS Gap	-55795.131	-555.55	-9344.69	12604.58	10067.98
2020	ISA	151929.04	269363.709	188064.96	195739.3	163948.1
	ISL	224833.832	254357.294	220282.85	181727.86	156941.17
	IS Gap	-72904.792	15006.4152	-32217.89	14011.44	7006.93

Source: Author's Calculation Based on Annual Report of the Selected 5 Banks (2011-2020)

4. Calculation of Relative IS Gap (2011-2020)

(BDT in million)

Year	Particulars	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	IS Gap	-21094.85	9651.52	217.34	-11435.46	-1509.21
	Total Assets	58276.33	117454.22	90898.90	82098.67	87140.11
	Relative IS Gap	-0.3620	0.0822	0.0024	-0.1393	-0.0173
2012	IS Gap	-22517.00	-14628.94	16725.85	-21644.12	-3165.03
	Total Assets	76215.22	137352.51	115736.84	117601.52	116553.01
	Relative IS Gap	-0.2954	-0.1065	0.1445	-0.1840	-0.0272
2013	IS Gap	-23499.19	-18492.44	32945.42	715.14	-9013.39
	Total Assets	95260.78	177196.64	130186.47	147148.49	152658.47
	Relative IS Gap	-0.2467	-0.1044	0.2531	0.0049	-0.0590
2014	IS Gap	-22929.73	-20005.52	27003.32	10421.55	-6777.24
	Total Assets	116739.57	179713.75	147472.63	157882.93	144841.87
	Relative IS Gap	-0.1964	-0.1113	0.1831	0.0660	-0.0468
2015	IS Gap	-16357.29	-10864.13	11982.2	654.92	1107.15
	Total Assets	145346.12	204593.47	177228.24	172124.71	168474.13
	Relative IS Gap	-0.1125	-0.0531	0.0676	0.0038	0.0066
2016	IS Gap	-7008.4677	-789.69	19450.05	10669.12	-3060.74
	Total Assets	180229.57	224492.97	50126.36	189563.21	182800.17
	Relative IS Gap	-0.0389	-0.0035	0.3880	0.0563	-0.0167
2017	IS Gap	-2205.48	1662.26	3759.79	17859.32	421.73
	Total Assets	210241.52	248605.24	61020.71	211185.41	204127.47
	Relative IS Gap	-0.0105	0.0067	0.0616	0.0846	0.0021
2018	IS Gap	-2692.40	7214.78	13035.68	23414.44	9263.24
	Total Assets	239770.63	279187.61	98845.12	253068.92	260169.93
	Relative IS Gap	-0.0112	0.0258	0.1319	0.0925	0.0356
2019	IS Gap	-55795.13	-555.55	-9344.69	12604.58	10067.98
	Total Assets	259638.37	315417.84	135748.46	282451.47	291385.64
	Relative IS Gap	-0.2149	-0.0018	-0.0688	0.0446	0.0346
2020	IS Gap	-72904.79	15006.42	-32217.89	14011.44	7006.93
	Total Assets	294892.13	367920.31	118329.34	335163.32	316363.74
	Relative IS Gap	-0.2472	0.0408	-0.2723	0.0418	0.0221

Source: Author's Calculation Based on Annual Report of the Selected 5 Banks (2011-2020)

5. Calculation of Interest Sensitivity Ratio of the Selected 5 Banks (2011-2020)

(BDT in million)

Year	Particulars	Trust Bank Ltd.	BRAC Bank Ltd.	City Bank Ltd.	Eastern Bank Ltd.	Mercantile Bank Ltd.
2011	ISA	27659.24	67754.9	53745.71	49321.3	46415.11
	ISL	48754.08	58103.38	53528.37	60756.76	47924.32
	Interest Sensitivity Ratio	0.5673	1.1661	1.0041	0.8118	0.9685
2012	ISA	40477.69	67969.85	56470.52	70665.02	58610.68
	ISL	62994.69	82598.79	39744.67	92309.14	61775.71
	Interest Sensitivity Ratio	0.6426	0.8229	1.4208	0.7655	0.9488
2013	ISA	56670.92	93162.43	72654.21	93580.13	80303.91
	ISL	80170.11	111654.87	39708.79	92864.99	89317.3
	Interest Sensitivity Ratio	0.7069	0.8344	1.8297	1.0077	0.8991
2014	ISA	71364.91	86937.39	76664.95	97515.02	69354.74
	ISL	94294.64	106942.91	49661.63	87093.47	76131.98
	Interest Sensitivity Ratio	0.7568	0.8129	1.5437	1.1197	0.9110
2015	ISA	82146.61	102728.47	93247.86	98870.49	87317.62
	ISL	98503.90	113592.60	81265.66	98215.57	86210.47
	Interest Sensitivity Ratio	0.8339	0.9044	1.1474	1.0067	1.0128
2016	ISA	109891.45	113578.61	120414.70	110744.75	96328.55
	ISL	116899.91	114368.30	100964.65	100075.63	99389.29
	Interest Sensitivity Ratio	0.9400	0.9931	1.1926	1.1066	0.9692
2017	ISA	137282.41	158139.19	133267.75	120587.51	105114.36
	ISL	139487.89	156476.93	129507.96	102728.19	104692.63
	Interest Sensitivity Ratio	0.9842	1.0106	1.0290	1.1739	1.0040
2018	ISA	158843.58	191764.86	153923.74	149225.00	149689.27
	ISL	161535.99	184550.08	140888.06	125810.56	140426.03
	Interest Sensitivity Ratio	0.9833	1.0391	1.0925	1.1861	1.0660
2019	ISA	135048.32	193865.61	178694.90	164402.33	163468.62
	ISL	190843.45	194421.16	188039.59	151797.75	153400.64
	Interest Sensitivity Ratio	0.7076	0.9971	0.9503	1.0830	1.0656
2020	ISA	151929.04	269363.71	188064.96	195739.30	163948.10
	ISL	224833.83	254357.29	220282.85	181727.86	156941.17
	Interest Sensitivity Ratio	0.6757	1.0590	0.8537	1.0771	1.0446

Source: Author's Calculation Based on Annual Report of the Selected 5 Banks (2011-2020)

6. Pooled OLS Regression Result on IRR

```
. regress IRR Infl GDPGr ROA NPL NIM DTL LOTA
```

Source	SS	df	MS			
Model	.213687879	7	.03052684	Number of obs = 50		
Residual	.133785486	42	.003185369	F(7, 42) = 9.58		
Total	.347473365	49	.007091293	Prob > F = 0.0000		
				R-squared = 0.6150		
				Adj R-squared = 0.5508		
				Root MSE = .05644		

IRR	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Infl	.2748276	.5950279	0.46	0.647	-.9259873	1.475642
GDPGr	-3.242124	1.341535	-2.42	0.020	-5.949451	-.5347969
ROA	-5.043108	1.959007	-2.57	0.014	-8.996545	-1.089671
NPL	.1423134	.5979886	0.24	0.813	-1.064476	1.349103
NIM	-2.264189	1.114366	-2.03	0.049	-4.513071	-.0153067
DTL	-.2995352	.1207753	-2.48	0.017	-.5432697	-.0558008
LOTA	.788483	.1529452	5.16	0.000	.4798271	1.097139
_cons	.99586	.1896713	5.25	0.000	.6130879	1.378632

Source: Estimated by the Author

7. Fixed Effect Regression Model on IRR

```
. xtreg IRR Infl GDPGr ROA NPL NIM DTL LOTA, fe
```

```
Fixed-effects (within) regression      Number of obs      =      50
Group variable: ID                    Number of groups   =       5

R-sq:  within = 0.5656                Obs per group: min =      10
      between = 0.0523                    avg =      10.0
      overall = 0.2643                    max =      10

                                          F(7,38)           =      7.07
corr(u_i, Xb) = -0.1716                Prob > F           =      0.0000
```

IRR	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
Infl	.4508864	.5335983	0.84	0.403	-.6293268	1.5311
GDPGr	-2.579218	1.215726	-2.12	0.040	-5.040326	-.1181097
ROA	-3.099618	2.104835	-1.47	0.149	-7.360634	1.161398
NPL	.9962395	.6956977	1.43	0.160	-.4121269	2.404606
NIM	-.5262792	2.050904	-0.26	0.799	-4.678118	3.625559
DTL	-.5826815	.1526287	-3.82	0.000	-.8916621	-.2737009
LOTA	.6114312	.1511037	4.05	0.000	.3055378	.9173245
_cons	1.199011	.1947603	6.16	0.000	.804739	1.593282
sigma_u	.06437982					
sigma_e	.04992602					
rho	.62445847	(fraction of variance due to u_i)				

```
F test that all u_i=0:      F(4, 38) =      3.92      Prob > F = 0.0093
```

Source: Estimated by the Author

8. Random Effect Regression Model on IRR

```
. xtreg IRR Infl GDPGr ROA NPL NIM DTL LOTA, re
```

```
Random-effects GLS regression           Number of obs   =       50
Group variable: ID                     Number of groups =        5

R-sq:  within = 0.4825                 Obs per group:  min =       10
      between = 0.8492                                     avg =      10.0
      overall  = 0.6150                                     max =       10

                                           Wald chi2(7)    =      67.08
corr(u_i, X) = 0 (assumed)             Prob > chi2     =      0.0000
```

IRR	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
Infl	.2748276	.5950279	0.46	0.644	-.8914056	1.441061
GDPGr	-3.242124	1.341535	-2.42	0.016	-5.871484	-.6127638
ROA	-5.043108	1.959007	-2.57	0.010	-8.882692	-1.203524
NPL	.1423134	.5979886	0.24	0.812	-1.029723	1.314349
NIM	-2.264189	1.114366	-2.03	0.042	-4.448306	-.0800711
DTL	-.2995352	.1207753	-2.48	0.013	-.5362505	-.0628199
LOTA	.788483	.1529452	5.16	0.000	.4887159	1.08825
_cons	.99586	.1896713	5.25	0.000	.6241111	1.367609
sigma_u	0					
sigma_e	.04992602					
rho	0	(fraction of variance due to u_i)				

Source: Estimated by the Author

9. Hausman Test on IRR

```
. hausman fe re
```

	—— Coefficients ——			
	(b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
Infl	.4508864	.2748276	.1760589	.
GDPGr	-2.579218	-3.242124	.662906	.
ROA	-3.099618	-5.043108	1.94349	.7698189
NPL	.9962395	.1423134	.8539261	.3555347
NIM	-.5262792	-2.264189	1.737909	1.721742
DTL	-.5826815	-.2995352	-.2831463	.0933211
LOTA	.6114312	.788483	-.1770519	.

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

```
chi2(7) = (b-B)'[(V_b-V_B)^(-1)](b-B)
          = 30.18
Prob>chi2 = 0.0001
(V_b-V_B is not positive definite)
```

Source: Estimated by the Author

H_0 = Random effect is efficient H_1 = Fixed effect is efficient

Probability > Chi2 = 0.0001 which is more significant. The value of p is less than the level of significance 0.05. So the null hypothesis cannot be accepted. So it can be said that the fixed effect regression model is appropriate for this analysis. That means,

H_1 = Fixed effect is efficient.